

has failed; if, indeed, the enemy be not led up, and introduced to, the joists under the flooring boards by the hollow lathed and plastered quartering partitions. In the timber enclosures and partitions which economy induces the Paris builder to introduce as substitutes for walls, the timber is so embedded in, and made part of a solid concrete, as to be protected from almost every casualty of which it is susceptible, and the building is insured against almost every possible chance of danger from its failure."

The mode adopted in France of forming partitions of stone rubble and plaster, and of constructing their ceilings, as described by Mr. Hosking, we quoted in our notice of the "Guide," and may be referred to by such of our readers as do not possess the book,—although they will do better by at once obtaining it.

In the second section of the same chapter Mr. Hosking, after speaking of the common practice of forming fire-proof floors by the use of cast-iron girders and flat arches in brickwork turned between them, describes a mode of forming a floor proof against fire, without the sacrifice of height entailed by the use of arches, or the fear of their thrust, which requires to be restrained by wrought iron tie rods. He says,—

"Let the binders be made of the full depth of the girders, opening them between the top and bottom flanges, not to waste metal. Form an open floor of slight cast-iron batten-like bars about three inches wide and three-eighths of an inch thick, and having their ends turned up and out to form a shoulder and a bearing lip, by which the bars may rest upon the lower flanges of the binders, and bring their own under-faces slightly below the level of the soffits of the girders and binders, and laid fully their own width apart. Raise a boarded table or platform, like a large mortar-board, up nearly to the under side of this open iron floor, and give it temporary support, adjusting its upper face at an inch and a quarter, or thereabouts, below the soffits of the girders and binders, and about an inch clear from the under-sides of the bar-battens, having first strewed a little dry sand over the surface of the board to prevent mortar from sticking to it, as a brickmaker does to his mould in moulding bricks. Then fill in from above to a thickness of not less than three inches from the top of the board with mortar, gauged with plaster so that it may set without waste of time. The mortar should be made to pass in under the whole of the ironwork—girders, binders, and bar-battens—and to cover these last and the flanges of the girders and binders to the same depth as the surface of the board is below their soffits, and so indeed as to form one uninterrupted slab of about three inches in thickness to the extent in area of the board of plaster-composition as a ceiling to the story below, hung up to the girders and binders by the open iron bar-battens which are incorporated with the slab of plaster-composition by the process."

The floor above is to be made of plain tiles, laid in two, three, or four thicknesses, having reference to the bearing from binder to binder.

Now, the last patent that has been taken out, having for its object to give security to buildings from the effects of fire, known as "Dr. Fox's fire-proof patent," and which is being carried out by Messrs. Fox and Barrett, is for a similar combination of materials as that described by Mr. Hosking, but differently arranged, and owing nothing to that suggestion (it is right to say), Dr. Fox having applied his system fifteen years ago in the construction of an extensive lunatic asylum known as "Northwoods," near Bristol. The system may be thus described. Small cast-iron joists are used of the L shape reversed, larger in the centre

than at the ends, having 6 inches bearing on the walls, and placed 18 inches apart for floors, and 22 inches apart for roofs. In the spaces between the joists, and resting on the bottom flange of the joists are placed in a contrary direction to the way in which the joists lie, strips of wood about an inch-and-a-half square and half-an-inch apath, serving at once as the ordinary ceiling laths, and to carry the floor which is formed as follows:—A coat of rough mortar, about one inch thick above the laths, is laid on the top of these, of such a consistence, that it may be pressed through the interstices and form a key for the ceiling underneath, which is afterwards laid on in the ordinary manner. Upon this first coat of mortar is laid a coat of pugging formed of road scrapings or refuse rubbish from the building, mixed with an eighth or tenth part of lime and passed through a pug mill.\* This is laid in, the whole depth of the joists, as a solid foundation to receive either a facing of lime and sand in certain proportions, coated with linseed oil, or a flooring of wood or stone. It thus forms a solid mass perfectly fire-proof, and, according to the calculations of the patentees, the cost does not exceed that of the ordinary mode of construction with timber. For roofs indeed, they assert that it is considerably cheaper than the common plan. Moreover, the expense of insurance is avoided, as well as injury from dry rot; and protection from vermin and insects is obtained.

In order to afford precise data, we will give the dimensions of the iron joists used in two of the rooms at "Northwoods," put up fifteen years ago. In one, where the bearing is 18 feet the joists are 3 inches deep at each end, increasing to 5½ inches in the middle, and tapering from ¾ to ½ of an inch at top in thickness. The bottom flange is 2½ inches wide and ¾ths of an inch thick, included in the depth already given of the joist. The average weight of iron is 15½ lbs. per foot. In another room, where the bearing is 10 feet, the depth of the joist is 2½ inches at each end, and 3½ inches in the centre; the thickness ¾ths to ½ an inch. The width of the flange is 1½ inch, and its depth ¾ inch. And the average weight of iron 8½ lbs. per foot.

We have not seen "Northwoods," but with a curious coincidence, only a few days ago, we received a communication from Mr. J. C. Christopher, one of the Metropolitan District Surveyors, testifying to the success of the system in this building, which he had accidentally visited. He says there is not a crack in any of the ceilings, that the house is warm and dry, and that the only repairs ever needed are performed by the gardener. The walls are not thicker than for an ordinary construction.

A large landing has recently been formed by this mode at the Middlesex Hospital, and we understand that it is to be employed to a considerable extent in the new Lunatic Asylum which is being erected for the same county, at Colney Hatch.

It is scarcely necessary now to insist on the dangerous consequences of making use of cast-iron beams of wide span, without intermediate supports, unless the beams are very large or protected from the effect of the flames should fire occur. When suddenly cooled with water the beams snap, and columns of the same material are liable to yield as well as break under the same circumstances. Under the system to which we have been referring, there

\* Where lime is readily procured, the refuse lime and ashes from the kilns may be substituted with advantage, forming a species of concrete.

would be little fear in this respect; for large spans, however, the patentees do not seem yet to have arranged their plans.

With reference to the use of iron for girders, we may mention, that Messrs. Mare and Co., the builders of the tubular bridge over the Menai Straits, are now making wrought-iron box girders and beams, which are likely to be found useful. For spans of 50 or 60 feet, to which extent these box girders are being applied, cast-iron could scarcely be trusted.

Again and again we protest against the absurdity of constructing buildings as if for the express purpose of readily burning, and urge, on the other hand, the importance of adopting every practicable precaution to render them fire-proof, and the sin against society which the neglect of these precautions involves.

GEORGE GODWIN.

### THE ELECTRIC LIGHT.

WHEN we mentioned Messrs. Staite and Petrie's electrical light three weeks ago, on the report of others, and what the patentees proposed to effect by it, we remarked that if they could thus produce a steady and sustained light, they had accomplished what had heretofore been the preventive to the substitution of galvanism for gas. Since then we have attended a private exhibition of the invention, and heard what Mr. Staite had to say upon the subject himself. The claims made for it are of an extraordinary nature,—power of producing a light equal to that of 10,000 wax candles from one square inch only of illuminating surface,—perfect safety, the light not being the result of combustion,—no possibility of explosion,—a light equal to 100 wax candles for one penny per hour,—that it is self acting, and universally applicable. Of the truth of much of this, if certain difficulties are or can be overcome, there is little doubt, but we are not in a position yet to say that this is the case. We have all seen in the lecture-room the brilliant light which may be obtained by electricity,—the difficulty was to produce this permanently and economically, and that this has yet been effected, we do not think satisfactory proof was afforded at the exhibition in question. For various purposes the light was extinguished every eight or ten minutes during the evening, and there seemed to be a necessity for adjustment, and for changing the carbon at the poles of the circuit, of which nothing was said in the inventor's address. We do not raise this doubt in a captious spirit, or with any desire to underrate the invention: when all that is asserted in this case can be effected, an immense advance will have been made in the science of lighting—a science yet in its infancy. We fear, however, that this is scarcely a "fact accomplished" yet, and for the sake of after-inventors it is desirable that the public should not be led into a contrary belief, and finding themselves hereafter disappointed, thus be induced to throw cold water on what may come next. The invention is a very important one, and we shall be glad when we can record our conviction that Messrs. Staite and Petrie have overcome all difficulties.

Had other journals been less unanimous, we might have been less reserved.

**SANITARY PROGRESS.**—East Cowes is likely to have the benefit of the Health Act, and the inhabitants are therefore looking forward to the establishment not only of a proper system of sewerage, but of water and gas, street repair, &c., all under their own control. —A committee has been formed at Aber-gavenny for carrying out the provisions of the Health Act. —Fire-engines, scavengers, and other agencies are at work in Leith and Edinburgh, cleansing wynds and closes; and in every town and village in the neighbourhood, such as Newhaven, Portobello, Dalkeith, Gilmerton, the authorities are astir, and nuisances are being rooted out. —With the conjoint liberal use of neutralising deodorizers, mortality and disease cannot but be thus vastly diminished, even in spite of cholera.